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10/588,369	10/16/2007	Uri Banin	BANIN4B	9217

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EXAMINER	
DULKA, JOHN P	

ART UNIT	PAPER NUMBER
2895	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/588,369	BANIN ET AL.	
	Examiner	Art Unit	
	John P. Dulka	2895	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 October 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *59-81* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *59-81* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 August 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *08/16/2007*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Application

Claims 1-58 are canceled as per amendment to claims received in 4 August, 2006 and new claims 59-81 are pending.

Specification

The disclosure is objected to because of the following informalities: pg. 1-2 under *List of References* number 12 lists two references strung together instead of one reference. Second reference starts with author Jun Y.W.. Please make a new list with correctly numbered references or delete the 2nd reference under number 12. Appropriate correction is required.

Information Disclosure Statement

The information disclosure statement filed 16 August, 2008 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered. In IDS under Foreign Patent Documents cite numbers 1 and 2 were not provided but were found by examiner and considered. In IDS under Non-Patent Literature Documents cite numbers 1-30, and 41 were not provided and were not considered.

Claim Objections

Claim 81 is objected to because of the following informalities: pg. 6 ln. 2 of claim 81 of amendment to claims states, "according of claim 59", please delete the word "according" or make claim 81 dependent on claim 59. Appropriate correction is required.

Claim Rejections - 35 USC § 112

Claim 65, dependent on claim 59, recites the limitation "said semiconductor material" in pg. 3 ln. 2-3 of claim 65 of amendment to claims. There is insufficient antecedent basis for this limitation in the claim because claim 59 does not disclose "said semiconductor material".

Claim 72, dependent on claim 71, recites the limitation "said branched shape" in pg. 4 ln. 2-3 of claim 72 of amendment to claims. There is insufficient antecedent basis for this limitation in the claim because claims 71, 70, and 68 do not disclose "said branched shape".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 59-65 and 75-81 are rejected under 35 U.S.C. 102(b) as being anticipated by Majumdar et al. in U.S. Application Publication 2002/0175408 entitled, *Methods of fabricating*

nanostructures and nanowires and devices fabricated therefrom, hereinafter referred to as Majumdar.

Majumdar anticipates:

limitations from claim 59, nanostructure having at least one elongated structure element **as illustrated in Fig. 25 pg. 12 ¶. 0146 number 206 is elongated** comprising a first material **as illustrated in Fig. 25 pg. 12 ¶. 0146 number 206 is made of a semiconductor material such as Si/SiGe**, wherein said elongated structure element being 100nm in length or less **as stated in pg. 4 ¶. 0068 the elongated portion may be approximately 100nm in length**, bears on at least one of its end portions a second material that differs from said first material in at least one property selected from: electrical conductivity, chemical reactivity and composition **as stated in Fig. 25 pg. 12 ¶. 0146 number 204 defines the tip of elongated nanostructure number 206 and consists of Au/gold alloy. A very similar structure of Fig. 24 pg. 11-12 ¶. 0144 number 188 defines the tip of elongated nanostructure number 194 and consists of Au/gold alloy. There exists a difference in composition, electrical conductivity and chemical reactivity between the metal Au and the Si/SiGe materials**.

Majumdar anticipates:

limitations from claim 60, Nanostructure according to claim 59 wherein the second material is metal or metal alloy **as stated in Fig. 25 pg. 12 ¶. 0146 number 204 defines the tip of elongated nanostructure number 206 and consists of Au/gold alloy. A very similar**

structure of Fig. 24 pg. 11-12 ¶. 0144 number 188 defines the tip of elongated nanostructure number 194 and consists of Au/gold alloy.

Alternatively Majumdar anticipates:

limitations from claim 59, nanostructure having at least one elongated structure element **as illustrated in Fig. 9 pg. 5 ¶. 0075 number 80 is elongated** comprising a first material **as illustrated in Fig. 9 pg. 5 ¶. 0075 numbers 82 and 84 are made of a semiconductor material such as Si/SiGe as mentioned in pg. 5 ¶. 0073**, wherein said elongated structure element being 100nm in length or less **as stated in pg. 4 ¶. 0068 the elongated portion may be approximately 100nm in length**, bears on at least one of its end portions a second material that differs from said first material in at least one property selected from: electrical conductivity, chemical reactivity and composition **as stated in Fig. 9 pg. 5 ¶. 0075 number 86 defines one end of an elongated nanostructure number 80 and may consist of polymer or semiconductor material as stated in pg. 5 ¶. 0074, last two sentences as illustrated in Fig. 9 pg. 5 ¶. 0075 numbers 82 and 84 are made of a semiconductor material such as Si/SiGe as mentioned in pg. 5 ¶. 0073**.

Majumdar anticipates:

limitations from claim 61, Nanostructure according to claim 59 wherein the second material is conductive polymer or insulating material **as stated in Fig. 9 pg. 5 ¶. 0075 number 86 defines one end of an elongated nanostructure number 80 and may consist of polymer or**

semiconductor as stated in pg. 5 ¶. 0074, last two sentences.

Majumdar anticipates:

limitations from claim 62, nanostructure according to claim 59 wherein the second material is semiconductor **as stated in Fig. 9 pg. 5 ¶. 0075 number 86 defines one end of an elongated nanostructure number 80 and may consist of polymer or semiconductor as stated in pg. 5 ¶. 0074, last two sentences**.

Majumdar anticipates:

limitations from claim 63, the nanostructure of claim 59, wherein said first material is selected from semiconductor material, insulating material, metal and mixtures thereof **as illustrated in Fig. 9 pg. 5 ¶. 0075 numbers 82 and 84 are made of a semiconductor material such as Si/SiGe as mentioned in pg. 5 ¶. 0073. Also as illustrated in Fig. 25 pg. 12 ¶. 0146 number 206 is made of a semiconductor material such as Si/SiGe**.

Majumdar anticipates:

limitations from claim 64, nanostructure having at least one elongated structure element **as illustrated in Fig. 9 pg. 5 ¶. 0075 number 80 is elongated** comprising a material being a conductive polymer or an insulating material **as stated in Fig. 9 pg. 5 ¶. 0075 number 86 defines an elongated nanostructure number 80 and may consist of polymer that is conductive because as mentioned in pg. 11 ¶. 140 and pg. 14-15 ¶. 0174-0188 the devices are electronic. Particularly pg. 18 ¶. 0220 suggests that the polymer/sheath is used as a gate**

contact, wherein said elongated structure element bears on at least one of its end portions a semiconductor material **as illustrated in Fig. 9 pg. 5 ¶. 0075 numbers 82 and 84 are made of a semiconductor material such as Si/SiGe as mentioned in pg. 5 ¶. 0073. Number 82 defines the end of the nanostructure**, wherein said conductive polymer or insulating material being different from said semiconductor material in at least one property selected from: electrical conductivity, chemical reactivity and composition **as illustrated in Fig. 9 pg. 5 ¶. 0075 numbers 82 and 84 are made of a semiconductor material such as Si/SiGe as mentioned in pg. 5 ¶. 0073**.

Majumdar anticipates:

limitations from claim 65, the nanostructure of claim 59, wherein said semiconductor material is selected from Group II-VI semiconductors, Group III-V semiconductors, Group IV-VI semiconductors, Group IV semiconductors, alloys made of these semiconductors, combinations of the semiconductors in composite structures, and core/shell structures of the above semiconductors **as stated in pg. 5 ¶. 0078 the semiconductor material used in the nanostructures may be II-VI therefore including CdSe**.

Majumdar anticipates:

limitations from claim 75, article of manufacture comprising the nanostructure of claim 59 **as stated in pg. 18 ¶. 0219-0220 the nanostructure device as defined by Majumdar and described by examiner for claim 59 may be used in a FET. Also note pg. 14-15 ¶. 0174-**

0188.

Majumdar anticipates:

limitations from claim 76, an electronic device comprising the nanostructure of claim 59, or into which the nanostructure of claim 59 is integrated **as stated in Fig. 34-35 pg. 18 ¶. 0219-0220 the nanostructure device as defined by Majumdar and described by examiner for claim 59 may be used in a FET. Also note pg. 14-15 ¶. 0174-0188**.

Majumdar anticipates:

limitations from claim 77, an electrode comprising the nanostructure of claim 59 **as stated in pg. Fig. 34-35 18 ¶. 0219-0220 the nanostructure device as defined by Majumdar and described by examiner for claim 59 may be used in a FET in which different parts/ends of nanostructure are used as contacts. Also note pg. 14-15 ¶. 0174-0188**.

Majumdar anticipates:

limitations from claim 78, a transistor comprising the nanostructure of claim 59 **as stated in pg. Fig. 34-35 18 ¶. 0219-0220 the nanostructure device as defined by Majumdar and described by examiner for claim 59 may be used in a FET. Also note pg. 15 ¶. 0180**.

Majumdar anticipates:

limitations from claim 79, a field effect transistor comprising the nanostructure of claim 59 **as stated in Fig. 34-35 pg. 18 ¶. 0219-0220 the nanostructure device as defined by Majumdar**

and described by examiner for claim 59 may be used in a FET. Also note pg. 14 ¶. 0177.

Majumdar anticipates:

limitations from claim 80, an optical device comprising the nanostructure of claim 59, or into which the nanostructure of claim 59 is integrated 59 **as stated pg. 14-15 ¶. 0184, 0185, and 0187 the nanostructure device as defined by Majumdar and described by examiner for claim 59 may be used in optical devices**.

Majumdar anticipates:

limitations from claim 81, self assembled construct comprising a plurality of nanostructures according of claim 59, wherein each nanostructure is linked to another nanostructure in the construct through its conductive zone **as depicted in Fig. 24 pg. 11-12 ¶. 0144 elongated number 194 consists of miniature stacks of Si/SiGe that are connected to one another by use of number 188-Au,gold alloy, during time of manufacture. Therefore the stacks are constructed through the conductive zone**.

Claims 68-74 are rejected under 35 U.S.C. 102(b) as being anticipated by Ramesh Patel in WIPO 91/06036 entitled, *Coated particles and methods of coating particles*, hereinafter referred to as Patel.

Patel anticipates:

limitations from claim 68, a method for forming a zone on at least one end portion of a nanostructure **as stated in pg. 3 ln. 28-31 and pg. 4 ln. 28-31 the coatings on the nanostructure may be such that only a part is covered--not completely covered**, wherein said zone differs from the whole nanostructure **as stated in Fig. 11 pg. 14 ln. 4-25 the coating of the nanoparticle that defines the zone is metal whereas the rest of the nanostructure is as stated in pg. 10 ln. 30-pg. 11 ln. 1 a dielectric which includes semiconductor or silica**, the method comprising: contacting a solution comprising nanostructures **as stated in Fig. 11 pg. 14 ln. 4-25 there is a liquid with dispersed dielectric nanoparticles** composed of at least one elongated structure element **as stated in pg. 10 ln. 8-30 the nanoparticles may be thread-like or cylindrical**, with a solution comprising an agent selected from metal source, metal alloy source, conductive polymer source, insulating material source and semiconductor source **as stated in pg. 14 ln. 4-25 a metal source such as pg. 11 ln. 15-25 lists gold or silver as a possible metal source**, to obtain upon isolation nanostructures being 100nm in length or less **as stated in pg. 10 ln. 7 the length of the nanoparticles may be between 5 to 20 nm and Fig. 19 shows a nanoparticle of 30nm that as stated in pg. 10 ln. 8-30 the nanoparticles may be thread-like or cylindrical**, bearing at least one zone on said at least one elongated structure thereof that differs from the nanostructure in at least one property selected from: electrical conductivity, chemical reactivity and composition **as stated in pg. 14 ln. 4-25 and keeping in mind as stated in pg. 3 ln. 28-31 and pg. 4 ln. 28-31 the coatings on the nanostructure may be such that only a part is covered--not completely covered. Therefore there is a zone that consists of metal and another material that is a semiconductor, providing for a difference**

in electrical conductivity, chemical reactivity and composition between the two materials.

Patel anticipates:

limitations from claim 69, a method according to claim 68 comprising: contacting a solution comprising nanostructures composed of at least one elongated structure element **as stated in Fig. 11 pg. 14 ln. 4-25 there is a liquid with dispersed dielectric nanoparticles**, with a solution comprising metal source or metal alloy source **as stated in Fig. 11 pg. 14 ln. 4-25 there is a metal source in acetone. Therefore as stated in Fig. 11 pg. 14 ln. 4-25 there is after contact one solution that contains both the nanoparticles and the metal ions**, to obtain upon isolation nanostructures bearing at least one zone comprising metal or metal alloy on said at least one elongated structure thereof **as stated in Fig. 11 pg. 14 ln. 4-25 and keeping in mind as stated in pg. 3 ln. 28-31 and pg. 4 ln. 28-31 the coatings on the nanostructure may be such that only a part is covered--not completely covered. Therefore there is a zone that consists of metal and another material that is a semiconductor, providing for a difference in electrical conductivity, chemical reactivity and composition between the two materials**..

Patel anticipates:

limitations from claim 70, the method according to claim 68 wherein said nanostructure is made of a first material comprising semiconductor material, insulating material, metal or mixtures thereof **as stated in pg. 10 ln. 30-pg. 11 ln. 1 the material is dielectric which includes a semiconductor**.

Patel anticipates:

limitations from claim 71, the method according to claim 70 wherein said first material is semiconductor material **as stated in pg. 10 ln. 30-pg. 11 ln. 1 the material is dielectric which includes a semiconductor**.

Patel anticipates:

limitations from claim 72, the method according to claim 71 wherein said branched shape comprises bipod, tripod and tetrapod **as stated in pg. 10 ln. 5-25 the shape of the nanoparticle may be any suitable shape and therefore may be a bipod. Specifically the nanoparticle may be a thread-like shape or a cylindrical shape therefore having two different elongated ends defining a bipod**.

Patel anticipates:

limitations from claim 73, a method for forming an electrically conductive zone **as stated in pg. 3 ln. 28-31 and pg. 4 ln. 28-31 the coatings on the nanostructure may be such that only a part is covered--not completely covered** on a nanostructure having at least one elongated structure element **as stated in pg. 10 ln. 8-30 the nanoparticles may be thread-like or cylindrical**, the method comprising: contacting, an organic solution comprising semiconductor nanostructures **as stated pg. 37 ln. 1-15 the nanoparticles are in an aqueous solution** with an organic solution comprising a metal or metal alloy source, a stabilizer and/or surfactant and/or electron donor to obtain upon precipitation semiconductor nanostructures **as stated pg. 37 ln. 1-15 the halides may be replaced with organic anions, thereby forming other metal**

complexes. Therefore as stated in Fig. 10 pg. 12 ln. 11-pg. 14 ln. 3 there is an organic solution that contains the metal ions mixed together to form an organic solution that has both the nanoparticles and metal ions of 100nm in length or less **as stated in pg. 10 ln. 7 the length of the nanoparticles may be between 5 to 20 nm and Fig. 19 shows a nanoparticle of 30nm. Furthermore as stated in pg. 10 ln. 8-30 the nanoparticle may be thread-like or cylindrical**, bearing at least one electrically conductive zone comprising metal or metal alloy on said at least one elongated structure thereof **in Fig. 10 pg. 12 ln. 11-pg. 14 ln. 3 and keeping in mind as stated in pg. 3 ln. 28-31 and pg. 4 ln. 28-31 the coatings on the nanostructure may be such that only a part is covered--not completely covered. Therefore there is a zone that consists of metal complexes and another material that is a dielectric such as a semiconductor. Therefore there exists an electrical conductivity, chemical reactivity and composition difference**.

Patel anticipates:

limitations from claim 74, the method according to claim 73 wherein said nanostructures are in the form of nanorods, bipods, tripods, tetrapods, nanowires or nanotubes **as stated in pg. 10 ln. 8-30 the nanoparticles may be thread-like or cylindrical**.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 66 and 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Majumdar as applied to claim 59 above.

Majumdar teaches:

limitations from claim 66, the nanostructure of claim 59 in the form of a tetrapod **as depicted in Fig. 34-35 pg. 15 ¶. 0189 there is a three terminal device. Majumdar discloses the claimed invention except for the 4th elongated arm of Fig. 34-35. It would have been an obvious matter of design to include the 4th arm, since applicant has not disclosed that the 4th arm solves any stated problems and instead is an obvious additional part added to Majumdar's Fig. 34-35. Additionally, since Majumdar teaches the two pieces that may be combined to form a 4-armed nanostructure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the nanostructure of Fig. 34-35 and the nanostructure element as described by examiner for claim 59 above in order to achieve the predictable result of providing a nanostructure device with 4 arms since a person with ordinary skill has good reason to pursue the known options within his or her technical grasp. KSR International Co. v.Teleflex Inc., 550 U.S. --, 82 USPQ2d 1385 (2007). Especially, since Majumdar already combines the nanostructure element as described by examiner for claim 59 above in order to form the nanostructure of Fig. 34-35**.

Majumdar teaches:

limitations from claim 67, the nanostructure according to claim 66 comprising a first material being CdSe or CdSe/ZnS in a core/shell layered arrangement, an elongated structure element of said tetrapod bearing on at least one of its end portions an electrically conductive zone made of gold **as stated in Fig. 25 pg. 12 ¶. 0146 number 204 defines the tip of elongated nanostructure number 206 and consists of Au/gold alloy. A very similar structure of Fig. 24 pg. 11-12 ¶. 0144 number 188 defines the tip of elongated nanostructure number 194 and consists of Au/gold alloy. Additionally in Fig. 25 pg. 12 ¶. 0146 number 206 is a semiconductor material. Furthermore as stated in pg. 5 ¶. 0078 the semiconductor material used in the nanostructures may be II-VI therefore including CdSe. There exists a difference in composition, electrical conductivity and chemical reactivity between the metal Au and the Si/SiGe materials**.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John P. Dulka whose telephone number is (571)-270-7398. The examiner can normally be reached on Mon-Thurs: 7:30am-5:00pm; Fri: 7:30am-4:00pm. Every other Friday Off. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, N. Drew Richards can be reached on (571)-272-1736. The fax phone number for the organization where this application or proceeding is assigned is (571)-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or (571)-272-1000.

2/25/09
/J. P. D./
Examiner, Art Unit 2895

/N. Drew Richards/
Supervisory Patent Examiner, Art Unit 2895